

REMARKS

Applicants acknowledge the indication of the allowability of the subject matter of Claims 6 and 15, as set forth at page 5 of the Office Action. In particular, the latter claims would be allowable if rewritten in independent form. However, for the reasons set forth hereinafter, Applicants respectfully submit that Claims 6 and 15 are allowable in their present dependent form.

In response to the objection to Claim 16, the phrase "said the joint" has been changed to "the joint", thereby eliminating the grammatical anomaly noted in the Office Action. Accordingly, reconsideration and withdrawal of this ground of objection are respectfully requested.

Claims 16-18 have been rejected under 35 U.S.C. §112, first paragraph for allegedly failing to comply with the enablement requirement of 35 U.S.C. §112, first paragraph. In particular, with regard to Claim 16, the specification states that the disclosure does not describe the limitation "covering said the joint between said cap and said substrate at least with a gel". In response to this ground of rejection, Applicants note that the phrase "said the joint" has been changed to "the joint" as noted previously. Moreover, as amended, the quoted phrase is clearly a reference to the joint which results from joining the cap to the substrate as provided in the immediately preceding paragraph of Claim 16. This recitation is supported by the disclosure in the specification in the sentence

which starts on the penultimate line of page 2 and carries over to page 3, which states that the assembly which results from joining the cap and the substrate is "covered with a moisture resistance by a gelled organic resin". In addition, page 3, line 11 expressly states that the joint is covered with a "gel". Accordingly, Applicants respectfully submit that the recitation in Claim 16 that the joint between the cap and the substrate is covered at least with a moisture resistant gel is fully supported by and disclosed in the specification. Applicants respectfully submit that a person skilled in the art would have no difficulty in understanding how such covering is accomplished, especially in view of the figures of the drawings which clearly show the same.

With regard to Claim 18, the Office Action states that the disclosure does not describe the recitation that "said gel is filled into said enclosure after said juncture". In response to this ground of rejection, Applicants have amended Claims 16 and 18 to change the word "hollow" to "first enclosure". Claim 18 thus recites that the substrate includes a wall that separates the first enclosure from a second enclosure which surrounds the first enclosure, and furthermore states that the gel is filled into the second enclosure. Applicants respectfully submit that this recitation is fully supported by the disclosure at, among other places, Claim 5, lines 1-2, which are directed to Figure 1, but clearly apply with equal validity to the other figures, in which a gel is shown as surrounding the enclosure which covers the MMIC components.

To the extent that this ground of rejection is predicated on the phrase "after said junction" which has now been changed to "after joining said cap to said substrate", Applicants respectfully submit that a person skilled in the art would clearly understand, both from the specification and from the figures of the drawing that, because the enclosure which surrounds the electronic components is not filled with gel, the gel was clearly filled after the cap is joined to the substrate. Accordingly, reconsideration and withdrawal of this ground of rejection are respectfully requested.

Claims 16-18 have been further rejected under 35 U.S.C. §112, second paragraph for failing to particularly point out and distinctly claim the invention, based on certain formal issues cited by the Examiner. In particular, the Office Action indicates that the meaning of the phrase "covering said the joint between said cap and said substrate at least with a gel" is unclear, as is the phrase "said gel is filled into said enclosure after said juncture". In response to these grounds of rejection, Applicants note that the elimination of the redundant phrase "said the" helps to clarify the language of Claim 16. Moreover, as noted previously, Applicants respectfully submit that the "joint" recited in the last paragraph of Claim 16 clearly refers to the result of joining the cap to the substrate, as recited in the immediately preceding paragraph. Moreover, the language of Claim 18 has been clarified by using the word "enclosure" uniformly throughout the claims in order to designate the space surrounding the electronic components 10, 11,

etc. As amended, Applicants respectfully submit that Claim 18 is clear and definite. Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

Claims 1-5, 7-14 and 16-18 have been rejected under 35 U.S.C. §102(b) or (e) as anticipated by either of Schmidt et al (U.S. Patent No. 6,600,103) or Uematsu et al (U.S. Patent No. 6,130,640). However, for the reasons discussed hereinbelow, Applicants respectfully submit that all claims of record in this application distinguish over both Schmidt et al and Uematsu et al, whether considered individually, or in combination.

The present invention is directed to a vehicle-mounted millimeter wave radar device, millimeter wave radar module and a method of manufacturing the same. In particular, the vehicle-mounted millimeter wave radar device according to the present invention is closed within an enclosure formed by joining a cap 50 to a substrate 1. The joining of the cap 50 to the substrate in this manner forms an enclosure which surrounds the millimeter wave generation units (MMICs 10) and its surrounding space on the substrate. In addition, a moisture resistant resin (gel 70) covers a joint (60) between the enclosure formed between the cap 50 and the substrate 1.

According to the present invention, the millimeter wave radar apparatus achieves favorable electrical characteristics, because it is surrounded in a hollow

structure such as described above, and formed on the substrate. Furthermore, because the joint between the enclosure and the substrate is covered with a moisture resistant resin such as a gelled organic resin, which has moisture resistance, the hollow structure which surrounds the MMICs can maintain resistance to moisture. Accordingly, it is possible to provide a low-cost millimeter wave radar RF module having increased productivity, while maintaining the millimeter wave electrical characteristic, even in the absence of an airtight enclosure.

A moisture resistant resin cannot be directly provided on a high frequency circuit substrate such as the substrate of the millimeter wave radar RF module according to the invention, because the resin causes large electrical losses. According to the structure of the present invention, however, the moisture resistant resin can be provided to protect the module of the millimeter wave radar, without such electrical losses. This is accomplished by the structure described above, in which the millimeter wave radar unit is surrounded by an enclosure formed by joining a cap to the substrate, with the moisture resistant resin at least covering the joint between the cap and the substrate.

The cited references, Schmidt et al and Uematsu et al disclose a vehicle-mounted millimeter wave radar which comprises a millimeter wave generation means, a substrate, and an enclosure. Although the enclosure in Schmidt et al and Uematsu et al is joined to a substrate to enclose the millimeter wave

generation means, neither reference discloses a moisture resistant resin for covering a joint between the enclosure and the substrate. Accordingly, the favorable electrical characteristics which are achieved by the present invention, by providing a moisture resistant resin which prevents moisture from seeping through the joint between the cap and the substrate, is not accomplished by either of these prior art references. That is, due to the lack of any disclosure of using a moisture resistant resin for this purpose, the Schmidt et al and Uematsu et al disclosures do not achieve the degree of moisture isolation provided by the present invention.

The latter feature of the invention is expressly recited in each of independent Claims 1, 5 and 16 of the present application. In particular, Claim 1 recites "a moisture resistant resin that covers the joint between said enclosure and said substrate," while Claim 5 recites, similarly, that "said cap and a joint between said cap and said substrate are covered with a moisture resistant resin". Finally, Claim 16 recites a step of "covering the joint between said cap and said substrate at least with a moisture resistant gel". Since features are neither taught nor suggested in either of Schmidt et al or Uematsu et al, Applicants respectfully submit that all claims of record in this application distinguish over those cited references.

In light of the foregoing remarks, this application should be in condition for allowance, and early passage of this case to issue is respectfully requested. If

there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #056208.52825US).

Respectfully submitted,



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